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TRANSMITTAL**

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Attorney Docket No. 198404US0

First Inventor or Application Identifier Franco LO GIUDICE, et al.

Title ADDITIVE COMPOSITION FOR ORGANIC POLYMERS AND ITS USE

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|---|--|--|--|
| APPLICATION ELEMENTS <small>See MPEP chapter 600 concerning utility patent application contents</small> | | ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231 | |
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| 4. <input checked="" type="checkbox"/> Oath or Declaration Total Pages 3 <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> Newly executed (original) b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. §1.63(d)) <small>(for continuation/divisional with box 15 completed)</small> <ul style="list-style-type: none"> i. <input type="checkbox"/> DELETION OF INVENTOR(S) <small>Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §1.63(d)(2) and 1.33(b).</small> | | | |
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Docket No. 198404US0

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S) Franco LO GIUDICE, et al.

SERIAL NO: New Application

FILING DATE: Herewith

FOR: ADDITIVE COMPOSITION FOR ORGANIC POLYMER AND ITS USE

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Respectfully Submitted,

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DOCKET NO.: 198404US0

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IN RE APPLICATION OF: Franco LO GIUDICE, et al.

SERIAL NO.: New Application

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REQUEST FOR SMALL ENTITY STATUS

This application qualifies for small entity status.

Respectfully Submitted,

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ADDITIVE COMPOSITION FOR ORGANIC POLYMERS AND ITS USE.

The present invention relates to an additive composition for organic polymers, the use of this composition or of the single hydrocarbon component, as 5 lubricating/detaching/fluidifying additive for organic polymers, and the polymeric compositions to which it is added.

The problem of reducing friction and easy detachment from the mould is well known with respect to organic 10 polymers different from PVC.

The known art has solved this problem by adding, among others, lubricating/detaching agents (oils, waxes, esters, etc.) to these polymers, which act as so-called "external" lubricants, in the sense that, owing to their 15 limited compatibility with the polymers, migrate to the interface between the polymer and metallic parts of the transforming machine, thus favouring detachment from the mould and reducing friction.

The use as polymer additives of process 20 lubricants/mould detaching agents, such as those previously described, having an "external" lubricating effect, requires however the application of specific conditions and dosage parameters, specific transformation thermal profiles, a particular geometry of the 25 transforming machines, precise transformation times,

together with compatibility with the polymers and relative formulation components and, above all, the incorporation of said additives which act as "external" lubricants by means of compounding (which is a general process). In fact, if these conditions are not respected, the following problems arise:

- over-lubrication phenomena, with deposits on the dies and moulds;
- leakage from the end-product over a period of time with the formation of stains or, in the case of containers, migration to the products contained therein;
- reduction in the thermal stability, in particular in polymers which are transformed at high temperatures;
- reduction in the transparency, in particular in PC, PMMA, styrene homopolymers and copolymers, polyamide copolymers, etc.;
- reduction in the mechanical properties (IZOD, tensile strength, etc.), in particular at low temperatures, in the thermal properties (VICAT, HDT), welding, surface treatment, coupling, painting, metallization, flame-resistance, etc.
- secondary reactions with the polymers or formulation components, which may cause hydrolysis, lipolysis, variations in the surface tensions, etc.;

- difficulty in transforming "hard" polymers due to the intrinsic viscosity or the presence of fillers, loadings, etc.

The present invention therefore proposes to overcome
5 the drawbacks present in the known art.

In particular, an object of the present invention relates to the use of a lubricating/detaching/fluidifying additive product or composition for organic polymers, comprising a saturated hydrocarbon having from 25 to 35
10 carbon atoms, with at least three side substituents consisting of a methyl group, optionally combined with at least one polysiloxane polymer having a molecular weight higher than 500,000.

A further object of the present invention relates to
15 a lubricating/detaching/fluidifying additive composition for organic polymers, comprising a saturated hydrocarbon having from 25 to 35 carbon atoms, with at least three side substituents consisting of a methyl group, optionally combined with at least one polysiloxane
20 polymer having a molecular weight higher than 500,000.

The present invention also relates to a polymeric composition containing additives, comprising an organic polymer and the additive product or composition.

In particular, the present invention relates to the
25 use of a lubricating/detaching/fluidifying additive

product for organic polymers, selected from the following compounds:

2,6,10,15,19,23-hexamethyltetracosane and its isomers having hexamethyltetracosane as the basic structure.

5 This product is preferably 2,6,10,15,19,23-hexamethyltetracosane.

The present invention relates to the use of the additive composition preferably for polymers such as all extrusion and moulding polycarbonates, polyamides, 10 copolyamides and high strength polyamide compositions, transparent ABS, styrene copolymers, methacrylates.

In particular, the additive product or composition, according to the present invention, is present in a quantity ranging from 0.01% to 80% by weight with respect 15 to the total weight of the organic polymer containing the additive.

The hydrocarbon component is preferably present in a quantity ranging from 0.01% to 50% by weight with respect to the total weight of the organic polymer containing the 20 additive and the polysiloxane polymer is present in a quantity ranging from 0.05% to 30% by weight with respect to the weight of the organic polymer containing the additive.

The hydrocarbon and polysiloxane polymer are present 25 in any ratio.

The additive product or composition is preferably present in a quantity ranging from 0.01% to 10% by weight with respect to the total weight of the organic polymer containing the additive, when the polymer is a
5 thermoplastic.

The additive compositions used according to the present invention can be formulated in any form: paste, liquid, supported on absorbing products or matrix resins (Master-Batches) etc.

10 They can also be formulated with any additive for polymers, pigment, dye, modifying agent, loading, filler, solvent, diluent, catalyst, etc. which are normally used with polymers, comprising liquid or gaseous polymerization systems.

15 The polymeric composition containing additives therefore comprises the organic polymer and the additive product or composition and optionally additives, modifying agents, loadings, fillers, solvents, diluents, etc.

20 In particular, the additive product or composition adopted according to the present invention can be used as a plasticizer in rubbers, in TR (thermoplastic rubbers) instead of naphthenic and/or paraffinic oils. It has a much higher compatibility with respect to these
25 additives.

PAGINE DE DEUX

The polymeric composition containing additives preferably comprises, as organic polymers, thermoplastic resins, natural and synthetic elastomers, thermoplastic elastomers, thermosetting resins.

5 The polymeric composition containing additives even more preferably comprises, as organic polymers, copolyesters (PET, PBT, PEN) and their copolymers, polyesters, polycarbonates, polyurethanes, polyacetals, polyamides, copolyamides, polyphenyleneoxides, 10 polyimides, polyamide-imides, polysulfones, polyketones, high-strength polyamide compositions, transparent ABS, styrene resins, methacrylates, polyetherimides.

These organic polymers can be used as such, or mixed with each other, copolymerized, formulated with other 15 polymers, formulated and/or modified with further additional substances, known and normally used in the field. Examples of these additional substances are pigments, filling and reinforcing substances (such as natural fibers, glass fibers, carbon fibers, aramidic 20 fibers, etc.), flame-retardant substances, shock-resistance agents (such as SBR, SBS, EPS, EPR, SEBS, EMP, EPDM), anti-UV substances and antioxidants, waxes, esters and oils.

The polymeric composition containing the additive 25 composition according to the present invention, can be

processed using the classical transformation technologies such as extrusion, calendering, blowing, injection moulding, coating, casting, impregnation, rotational moulding, fiber spinning, non-woven fabrics (of the 5 spunbonded type).

The polymeric composition containing the additive according to the present invention, can also be used for extruded PA, acrylic, PVDC and PVA (for use at low temperatures) films or perfectly transparent PMMA plates, 10 without the formation of plate-out on the dies, or on the calender or on the calibrator, etc.

The use, according to the present invention, of the hydrocarbon product as additive, allows the production of transparent polymers (copolymides, styrene copolymers, 15 polycarbonates, polymethacrylates, transparent ABS, etc.) with excellent process lubrication and mould detachment, unaltered optical and mechanical characteristics also at low temperatures. In this particular case, the additive composition does not comprise the presence of siloxane 20 polymers in order to prevent the transparency from being modified. The additive comprising the siloxane polymer can be used for the same polymers, when not transparent.

The use of this additive product or composition furthermore, allows the production of high molecular 25 weight polymers, suitable for extrusion (polyamides,

polycarbonates, polyolefins), which can be easily injection moulded.

The polymeric composition containing the additive product or composition according to the present invention, also has the following characteristics: dyed and/or loaded and/or filled polymers can be obtained, which can be processed with lower thermal profiles, with an improved processability, better dispersion of the pigments, loadings, fillers, flame-retardant agents and less wear of the transformation plants. As a result polymeric compositions with high percentages of loadings and/or fillers, and/or flame-retardant agents can be obtained, of any type, to be used as such or as Master Batches.

In addition, in the case of polymers sensitive to temperature (such as PVA) or temperature oscillations (such as TPU), the polymeric composition containing the additive according to the present invention can be more easily processed.

In the case of spinning polymers, the polymeric composition containing the additive has homogeneous and constant mechanical and stability characteristics during the whole production.

In addition, the polymeric composition containing the additive product or composition according to the

present invention, can be easily detached from the mould when the polymer is a thermosetting product for impregnation and/or casting.

In the case of polymeric compositions containing 5 additives, where the polymer consists of expanded polyurethanes, homogeneous cells are obtained. These compositions moreover can be used as polymeric compositions for paints in powder form, which are easily extrudable, perfectly dispersible and with leveled end-10 surfaces, or as easily extrudable polymeric compositions for hot melts. Polymeric compositions containing additives are also obtained, wherein the polymer is an epoxy resin and zinc or copper, or other easily processable metals, in powder form.

15 The polymeric compositions containing additives according to the present invention, can be polymeric compositions based on thermoplastic rubbers (SBS, SEBS, etc.), oil-extended by the addition according to the present invention or with the use of the product or 20 composition according to the present invention, or with cuts thereof with paraffinic or naphthenic oils, with extremely reduced blooming phenomena and stains.

The polymeric composition containing additives according to the present invention, can be a polymeric 25 composition for the extrusion/calendering of plates and

films (PA, PVC, PVDC, PE, PP, acrylic, PMMA, etc.) for use at room temperature or low temperatures (for example for frozen food containers) with an improved flexibility.

In addition said polymeric composition according to the

5 present invention can be a polymeric composition based on vinylic plastisols, expanded PU, rubbers for use in the food industry (for example in cap inlay), or a polymeric composition for self-lubricating end-products, or for the production of aqueous emulsions to be used as detaching

10 agents.

Finally, the additive is applied separately to said polymeric compositions, i.e. before moulding, also at room temperature and with slow mixers, without the necessity of incorporating the additive via

15 extrusion/compounding. The polymer is thus less stressed and does not lose its mechanical and optical properties.

In particular, the additives can be incorporated into the polymers described and listed above in any preparation and processing step, also including the

20 start-up and/or operating phase.

One of the advantages of the additive product or composition according to the present invention is that it has universal use, practically for all polymers and relative formulations, that it is effective even at very

25 low dosages and is suitable for transparent polymers.

The composition or product used as additive according to the present invention also has the contemporaneous functions of detaching agent from the mould, dispersing agent for pigments, additives and loadings, apparent viscosity reducer (in the molten state), "external" lubricant (reduction in the friction between polymers and metallic parts), and "internal" lubricant (reduction in the interface friction between polymer/polymer, polymer/loadings, polymer/filler, etc.), viscosity reducer for vinylic plastisols, impermeabilizing agent, also with respect to bacteria and mildew.

They can also be used by external addition, i.e. without the necessity of incorporation via extrusion or compounding, and therefore have enormous technical and economic advantages, as the compatibility is so high that the polymers containing additives, when left to rest for a certain period of time, completely absorb these additives, remaining dry and free-flowing.

They can also be used as humectants for binding powders to polymer granules, as bases for pigmenting pastes for organic polymers, etc.

The additive product or composition can additionally be used in high-strength polymers also operating at low temperatures or flexible polymers also at extremely low

temperatures, and can also be used as a plasticizer in oil-extended TR rubbers (SBS, SEBS, etc.), also destined for the food, cosmetic, pharmaceutical industries, etc. where absence of migration, odour, flavour, etc. are
5 required.

The use of the additive product or composition according to the present invention as a base for pigmenting pastes for organic polymers or mould detaching formulates for rubbers or thermosetting resins, allows
10 the production of pastes or formulates which are of universal use, are easily dispersible in all polymers, pastes or formulates without particular interference with the rheology of the polymers containing additives, and extremely fluid, even at low temperatures.

15 The characteristics and advantages of the product or composition used according to the present invention can be better understood from the detailed and illustrative description provided below.

EXAMPLES

20 The polymers in granular form were mixed at room temperature with the product or composition used as additive according to the present invention, and then left to rest for 48 hours.

A part of these was subsequently moulded as such, on
25 an injection press.

Another part was extruded on a Union single-screw extruder (diameter 28 mm, length 20 diameters, compression ratio 1:4, screw rate set at 30 rpm), using thermal profiles suitable for the polymer used, and 5 subsequently moulded.

The same polymers in granular form were mixed with other commercial additives having the same functions as the products or compositions used as additives according to the present invention, and were then extruded and 10 moulded. The results were compared with those obtained above.

The "spaghetti" obtained were cut into granules to enable them to be injection moulded.

In the case of the additive according to the present 15 invention, no difference was observed between the polymers with external addition followed by moulding and the polymers to which the additive was applied in dispersed form by drawing followed by moulding.

The Melt Flow Index (MFI) parameter was also 20 measured for a fraction of the granules according to the regulation ASTM D 1238.

EXAMPLE 1

Film-grade PEHD (MFI = 5), containing 0.08% of the additive 2,6,10,15,19,23-hexamethyltetracosane.

25 The extrusion proved to be more regular than the

same PEHD without additive, the flow-rates were increased by 12% and the surface defects due to infused products (fish-eyes).

EXAMPLE 2

| | Polymer additive % | MFI | Mouldability | Notes |
|----|-----------------------|--------------------------------------|--------------|--|
| 5 | PEHD | 0 | 2 | difficult |
| 10 | PEHD | 0.1 | 4.2 | very easy Moulds like a product with MFI = 10 |
| | PEHD | 0.1+0.1 polysiloxane MW > 500,000 | 4.4 | even easier Moulds at T 10°C lower |

EXAMPLE 3

A blue phthalocyanine pigment in powder form was added to film-grade PELD (with MFI equal to 5).

15 The end-product had spots and trimmings.

The same PELD to which 0.1% of 2,6,10,15,19,23-hexamethyltetracosane was added externally, had none of the above defects.

EXAMPLE 4

| | Polymer additive % | Mouldability |
|----|---|---|
| 20 | PA-6 ($\eta=2.7$) <u>non-nucleated</u> | 0 <ul style="list-style-type: none">- long cycles (over 20")- sticks to the mould- does not complete the shape |
| 25 | PA-6 ($\eta=2.7$) <u>non-nucleated</u> | 0.1 <ul style="list-style-type: none">- fast cycles (about 5")- detaches well from the mould- completes the shape, as if more fluid, but MFI is the same |

The same non-nucleated polymer, containing 0.3% of metal stearates, has detachment difficulties.

EXAMPLE 5

5

| Polymer | 2,6,10,15,19,23 hexamethyltetracosane additive % | Mouldability |
|-------------------------|--|--|
| Transparent copolyamide | 0 | -long cycles (over 15") -sticks to the mould -does not have dimensional stability |
| Transparent copolyamide | 0.1 | -fast cycles (about 5") -detaches well from the mould -maintains dimensional stability -transparency is unchanged |

10

The same polymer, containing 0.2% of amide waxes, detaches reasonably well but loses transparency.

EXAMPLE 6

15

| Polymer | 2,6,10,15,19,23 hexamethyltetracosane additive % | Mouldability |
|-----------------------------|--|---|
| PMMA copoly- mer MFI = 2 | 0 | -difficult loading into the screw -high friction which causes degradation, yellowing and spots |
| PMMA copoly- mer MFI = 2 | 0.1 | -fast cycles -easy loading into the screw -transparency is unchanged |

EXAMPLE 7

20

| Polymer | 2,6,10,15,19,23 hexamethyltetracosane additive % | Mouldability |
|---|--|---|
| PET/f.g. (30%) (PET with i.v.= 0.78) | 0 | -long cycles (over 40") -sticks to the mould |
| PET/f.g. (30%) (PET with i.v.= 0.78) | 0.2 | -reduced cycles (about 25") -detaches well from the mould |
| PET/f.g. (30%) (PET with i.v.= 0.78) | 0.2 + 0.2 of polysiloxane MW > 500,000 | - cycles reduced to 15" - detaches well from the mould - high dimensional stability |

EXAMPLE 8

| | Polymer hexamethyltetracosane additive % | Behaviour during extrusion, end-characteristics | |
|----|---|--|--|
| 5 | PET i.v.= 0.64 continuous filament Extrusion | 0 | Standard behaviour |
| | PET i.v.= 0.64 continuous filament extrusion | 0.5 | - no breakage - reduction in head pressure - 3% increase in tenacity |
| 10 | PET i.v.= 0.64 continuous filament extrusion | 1 | - no breakage - reduction in head pressure - 5% increase in tenacity |
| | PET i.v. = 0.64 continuous filament extrusion | 2.8 | - no breakage - reduction in head pressure - 8% increase in tenacity |

This test demonstrates the compatibility of the
15 additives according to the present invention even with
high dosages, in an extremely critical application with
respect to both the type of end-product and high
temperatures used.

EXAMPLE 9

20 A product is obtained starting from a polymer
consisting of a PET staple extrusion (i.v. = 0.72)
obtained from crushed recycled bottles, containing 0.1%
of 2,6,10,15,19,23-hexamethyltetracosane and 0.1% of
polysiloxane having a molecular weight higher than
25 500,000, in which problems relating to extruder

oscillations, cavitations, pulsations responsible for continual thread breakage, were completely solved. At the same time there is a considerable reduction in the pressure at the head (for example from 54 to 48 bars).

5 EXAMPLE 10

| Polymer | 2,6,10,15,19,23 hexamethyltetracosane additive % | Mouldability |
|-------------------------------------|--|---|
| Styrene copolymer (transparent ABS) | 0 | <ul style="list-style-type: none">- medium cycles- sticks to the mould- limited dimensional stability |
| Styrene copolymer (transparent ABS) | 0.05 | <ul style="list-style-type: none">- fast cycles- detaches easily from mould- very high dimensional stability- transparency unchanged |

EXAMPLE 11

| Polymer | 2,6,10,15,19,23 hexamethyltetracosane additive % | Mouldability and transparency |
|-------------|--|--|
| Moulding PC | 0 | <ul style="list-style-type: none">- difficult detachment from the mould- yellowing due to shear |
| Moulding PC | 0.1 | <ul style="list-style-type: none">- fast cycle- easy detachment from the mould- no migration on the mould- unchanged transparency- unchanged mechanical properties |
| Moulding PC | 0.5 | <ul style="list-style-type: none">- fast cycle- easy detachment from the mould- no migration on the mould- unchanged transparency- unchanged mechanical properties |
| Moulding PC | 1 | <ul style="list-style-type: none">- fast cycle- easy detachment from the mould- no migration on the mould- unchanged transparency- unchanged mechanical properties |

The same polymer, containing 0.1% of silicon oil (η = 30,000), or 0.2% of cetyl-stearyl-palmitate, or Behenyl-behenate, or pentaerythritol tetrastearate, or a 5 secondary amide, has a slightly longer cycle and a drop in mechanical properties and transparency (ranging from 3 to 5%)

10 EXAMPLE 12

| Polymer | 2,6,10,15,19,23 hexamethyltetracosane additive % | Mouldability and transparency |
|--------------|--|---|
| Extrusion PC | 0 | - does not fill mould - high yellowing |
| Extrusion PC | 0.1 | - fills mould - stable transparency |

As is evident from the above description, the use of these "processing-aid" products or compositions proves to be particularly advantageous, firstly because it allows the partial or total substitution of groups of additives 20 having a limited compatibility, and also because these "processing-aid" products or compositions have a universal use. They can also be used for high viscosity/high MW polymers (suitable for extrusion) also in injection moulding. Finally, they can be added 25 "separately" without requiring extrusion and compounding.

CLAIMS

1. A lubricating/detaching/fluidifying additive composition for organic polymers, comprising a saturated hydrocarbon having from 25 to 35 carbon atoms with at least three side substituents consisting of a methyl group, combined with at least one polysiloxane polymer having a molecular weight higher than 500,000.
2. The use of a lubricating/detaching/fluidifying additive composition for organic polymers, comprising a saturated hydrocarbon having from 25 to 35 carbon atoms with at least three side substituents consisting of a methyl group, optionally combined with at least one polysiloxane polymer having a molecular weight higher than 500,000.
3. A polymeric composition containing an organic polymer and a lubricating/detaching/fluidifying additive composition for organic polymers, comprising a saturated hydrocarbon having from 25 to 35 carbon atoms with at least three side substituents consisting of a methyl group, optionally combined with at least one polysiloxane polymer having a molecular weight higher than 500,000.

4. The additive composition according to claim 1,
characterized in that the hydrocarbon is selected
from 2,6,10,15,19,23-hexamethyltetracosane and its
isomers having hexamethyltetracosane as basic
5 structure.
5. The additive composition according to claim 1,
characterized in that the hydrocarbon is 2,6,10,15,
19,23-hexamethyltetracosane.
6. The additive composition according to claim 1,
10 characterized in that the additive product or
composition is present in a quantity ranging from
0.01% to 80% by weight with respect to the total
weight of the organic polymer containing said
additive.
- 15 7. The additive composition according to claim 1,
characterized in that the hydrocarbon is present in
a quantity ranging from 0.01% to 50% by weight with
respect to the total weight of the organic polymer
containing said additive and the polysiloxane
20 polymer is present in a quantity ranging from 0.05%
to 30% by weight with respect to the weight of the
polymer containing the additive.
8. The additive composition according to claim 1,
characterized in that the hydrocarbon and
25 polysiloxane polymer are present in any ratio.

9. The additive composition according to claim 1,
characterized in that the additive product or
composition is present in a quantity ranging from
0.01% to 10% by weight with respect to the total
5 weight of the organic polymer containing said
additive when the polymer is a thermoplastic.
10. The additive composition according to claim 1,
characterized in that it is formulated in any
physical form, either in solution or supported on
10 absorbing products or polymeric matrixes.
11. The additive composition according to claim 1,
characterized in that it is formulated with
additional additives, modifiers, fillers, loadings
for organic polymers.
- 15 12. The composition containing additives according to
claim 3, characterized in that the hydrocarbon is
selected from 2,6,10,15,19,23-hexamethyltetracosane
and its isomers having hexamethyltetracosane as
basic structure.
- 20 13. The composition containing the additive according to
claim 3, characterized in that the hydrocarbon is
2,6,10,15,19,23-hexamethyltetracosane.
14. The composition containing the additive according to
claim 3, characterized in that the additive product
25 or composition is present in a quantity ranging from

0.01% to 80% by weight with respect to the total weight of the organic polymer containing said additive.

15. The composition containing the additive according to

5 claim 3, characterized in that the hydrocarbon is present in a quantity ranging from 0.01% to 50% by weight with respect to the total weight of the organic polymer containing said additive and the polysiloxane polymer is present in a quantity
10 ranging from 0.05% to 30% by weight with respect to the weight of the polymer containing the additive.

16. The composition containing the additive according to claim 3, characterized in that the hydrocarbon and polysiloxane polymer are present in any ratio.

15 17. The composition containing the additive according to
claim 3, characterized in that the additive product or composition is present in a quantity ranging from 0.01% to 10% by weight with respect to the total weight of the organic polymer containing said
20 additive, when the polymer is a thermoplastic.

18. The composition containing the additive according to claim 3, characterized in that the organic polymers are thermoplastic resins, thermoplastic elastomers, thermosetting resins.

25 19. The composition containing the additive according to

- claim 18, characterized in that the organic polymers
are copolyesters (PET, PBT, PEN) and their
copolymers, polyesters, polycarbonates,
polyurethanes, polyacetals, polyamides,
5 copolyamides, polyphenyleneoxides, polyimides,
polyamide-imides, polysulfones, polyketones, high-
strength polyamide compositions, transparent ABS,
styrene resins, methacrylates, polyetherimides.
20. The composition containing the additive according to
10 claim 19, characterized in that the organic polymers
are polycarbonates, polyesters, polyamides,
copolymers, high-strength polyamide compositions,
transparent ABS, styrene copolymers, methacrylates.
21. The composition containing the additive according to
15 claim 3, characterized in that the polymers can be
as such, or mixed with each other, copolymerized,
formulated with other polymers, formulated and/or
modified with one or more additional substances.
22. The composition containing the additive according to
20 claim 3, characterized in that said additional
substances are pigments, filling or reinforcing
products, such as natural fibers, glass fibers,
carbon fibers, aramidic fibers, flame-retardant
substances, shock-resistance agents such as SBR,
25 SBS, EPS, EPR, SEBS, EMP, EPDM, anti-UV substances

and antioxidants, waxes, esters and oils.

23. The composition containing the additive according to
claim 3, characterized in that the additive
composition consists of 2,6,10,15,19,23-
hexamethyltetracosane and the organic polymer is
selected from polycarbonates, polyesters,
copolyamides, transparent ABS, styrene copolymers,
methacrylates.

① 24. The use of the additive composition according to any
of claims 1, 4-11, in formulations in the form of
paste, liquid, supported on absorbing products or
matrix resins (Master-Batches), etc.

25. The use according to claim 2, characterized in that
the hydrocarbon is selected from 2,6,10,15,19,23-
hexamethyltetracosane and its isomers having
hexamethyltetracosane as basic structure.

26. The use according to claim 25, characterized in that
the hydrocarbon is 2,6,10,15,19,23-hexamethyltetra-
cosane.

20 27. The use according to claim 26, characterized in that
the organic polymers are polycarbonates, polyesters,
copolyamides, transparent ABS, styrene copolymers,
methacrylates.

25 ② 28. A process for the preparation of the polymeric
composition containing additives according to any of

claims 3, 12-23, characterized in that the additive composition is added separately to the organic polymer which is then subjected to classical processing such as extrusion, for example.

- 5 29. The polymer obtained by means of the process according to claim 28.

CONFIDENTIAL

Abstract

A lubricating/detaching/fluidifying additive composition for organic polymers is described, comprising 5 a saturated hydrocarbon having from 25 to 35 carbon atoms with at least three side substituents consisting of a methyl group, combined with at least one polysiloxane polymer having a molecular weight higher than 500,000. The use of this composition or single hydrocarbon 10 component as lubricating/detaching/fluidifying additive for organic polymers, is also described, together with a polymeric composition containing additives, comprising an organic polymer and the additive composition.

The use according to the present invention is 15 particularly advantageous as it is universal (the same additive for all organic polymers, regardless of their formulation); it allows the use of high viscosity/high M.W. polymers (suitable for extrusion), also in injection moulding, and enables the additive to be applied 20 externally to the polymer.

Declaration and Power of Attorney for Patent Application

Dichiarazione e procura ai fini della domanda di brevetto

Italian Language Declaration

Il sottoscritto inventore dichiara che:

La propria residenza, recapito postale e cittadinanza corrispondono a quanto indicato in calce, sotto la propria firma.

Ritiene di essere il primo ed unico inventore originale (se viene elencato in calce un solo nominativo) o il coinventore primo ed originale (se è elencato più di un nominativo) del oggetto rivendicato e per il quale il sottoscritto presenta domanda di brevetto. La invenzione in questione è chiamata.

"COMPOSIZIONE ADDITIVANTE PER POLIMERI ORGANICI E SUO USO"

e la sua descrizione è allegata alla presente Dichiarazione a meno:

è qui allegato

II _____

è stata depositata una domanda di brevetto statunitense numero o una domanda di brevetto internazionale PCT numero

_____ che è stata modificata il

_____ (se applicabile).

Il sottoscritto dichiara inoltre di aver letto e compreso il contenuto della descrizione identificata in precedenza, rivendicazioni comprese, come modificati dall'eventuale modifica summenzionata.

Il sottoscritto riconosce l' obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codice dei Regolamenti Federali, § 1.56.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

"ADDITIVE COMPOSITION FOR ORGANIC POLYMERS AND ITS USE"

the specification of which:

is attached hereto.

was filed on _____

as United States Application Number or PCT International Application Number

_____ and was amended on

_____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

Italian Language Declaration

Il sottoscritto rivendica con la presente la priorità prevista dal Titolo 35, Codice degli Stati Uniti, § 119(e)-(d) o § 365(b) in relazione a qualsiasi domanda o domande estere di brevetto o certificato di inventore, o dal Titolo 35, § 365(a) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale è designato almeno un paese diverso dagli Stati Uniti, i suddetti domande e certificati essendo elencati sotto, e, spuntando le seguenti caselle, ha anche identificato sotto qualsiasi domanda estera di brevetto o certificato di inventore, o domanda internazionale PCT, la cui data di deposito preceda quella della domanda per la quale è rivendicata la priorità.

Prior Foreign Application(s)
(Domande Estere Anteriori)

MI99A 002124 **ITALY**
 (Number) (Country)
 (Número) (Nazione)

_____ _____
 (Number) (Country)
 (Número) (Nazione)

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below, and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority claimed
Diritto di priorità
rivendicato

| | | |
|--|-------------------------------------|--------------------------|
| 12 OCTOBER 1999 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| (Day/Month/Year Filed) (Giorno/Mese/Anno di deposito) | Yes Si | No No |

| | | |
|--|--------------------------|-------------------------------------|
| _____ | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| (Day/Month/Year Filed) (Giorno/Mese/Anno di deposito) | Yes Si | No No |

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codici degli Stati Uniti, § 119(e), in relazione a qualsiasi domanda o domande provvisorie degli Stati Uniti elencate sotto.

_____ _____
 (Application No.) (Filing Date)
 (Nº della domanda) (Data di deposito)

_____ _____
 (Application No.) (Filing Date)
 (Nº della domanda) (Data di deposito)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codice degli Stati Uniti, § 120, in relazione a qualsiasi domanda o domande statunitensi, o dal Titolo 35, § 365(c) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale sono designati gli Stati Uniti, i suddette domande essendo elencate sotto e, nella misura in cui l'oggetto di ciascuna rivendicazione di questa domanda non sia stato esposto nella domanda statunitense o internazionale PCT anteriore nel modo previsto dal primo paragrafo del Titolo 35, Codice degli Stati Uniti, § 112, riconosce l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codici dei Regolamenti Federali, § 1.56, le quali diventino disponibili durante il periodo compreso tra la data di deposito della domanda anteriore e la data di deposito nazionale o internazionale PCT della presente domanda.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

_____ _____
 (Application No.) (Filing Date)
 (Nº della domanda) (Data di deposito)

_____ _____
 (Status) (patented, pending, abandoned)
 (Stato) (concessione di brevetto, in corso di esame, abbandono)

_____ _____
 (Application No.) (Filing Date)
 (Nº della domanda) (Data di deposito)

_____ _____
 (Status) (patented, pending, abandoned)
 (Stato) (concessione di brevetto, in corso di esame, abbandono)

Con la presente, il sottoscritto dichiara veritiero tutte le affermazioni contenute in questa domanda in relazione alle proprie conoscenze e di ritenere vere tutte le affermazioni o informazioni presentate. Dichiara inoltre che tali asserzioni sono state espresse nella piena consapevolezza che le dichiarazioni intenzionalmente false sono punibili con una prigione, l'incarcerazione o entrambe, ai sensi della Sezione 1001 del Titolo 18 del Codice degli Stati Uniti e che tali dichiarazioni intenzionalmente false possono mettere a repentaglio la validità della domanda o di qualsiasi brevetto riuscito in merito.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Italian Language Declaration

- PROCURA: Il sootscritto inventore nomina con la presente il seguente avvocato o avvocati e/o agente o agenti al fine di istruire questa pratica e di condurre tutte le operazione ad essa pertinenti presso l'Ufficio dei Brevetti e Marchi di Fabbrica: (Elencare il nome ed il numero di matricola).

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (*list name and registration number*)

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(Fornire le stesse informazioni e le firme del terzo e degli ulteriori coinventori.)

(Supply similar information and signature for third and subsequent joint inventors)